21. The system according to claim 1, wherein the data related to Chinese characters further includes indicators of said characters' membership within various subsets of Chinese characters.

REMARKS

This is responsive to the Office Action dated September 17, 1999, which has been carefully considered. This Amendment addresses each of the rejections posed by the examiner. Accordingly, reconsideration is respectfully requested.

The claims have been amended to overcome the Examiner's formal objections thereto in the Official Action, and to better distinguish the claimed invention over the prior art. No new matter is believed to have been added to the subject application as a result of the changes made thereto.

The Invention

In brief summary, the invention provides an interactive and self-evolving system for efficiently inputting Chinese character based text into machines. The system uses an apparatus having an input device, a display device and a database that contains data related to the taught order of strokes used to write a character, the frequency of occurrence of the character as the first character of a word with respect to an operator's language, the orthographic components of the character in writing order, and indicators of the character's membership within various subsets of Chinese characters.

In operation, the operator and the apparatus form a closed loop feedback system whereby the operator reacts to visual information produced by the system and supplies additional data to and decisions through keystrokes or other input means. The apparatus reacts to the operator's input data with additional information. In this process, the system is continuously updated to reflect the frequency of input characters that are actually used over time.

The operator types or otherwise inputs strokes of a character one by one. As each stroke is entered, the accumulated strokes are displayed in an input area on the display device. Additionally, as each stroke is entered, the display of character candidates will change to display the most frequent characters that begin with the sequence of strokes entered. When the desired character appears, the operator merely selects that character. The display order of prospective component candidates is based on the cumulative frequencies of all of the possible characters (given the previous stroke and component selection) for which that component is the next written component. The system determines this order by accumulating the sum of the frequencies for each component from each character that qualifies as a candidate (in accordance with the previous stroke and component selections). By computing the cumulative frequency of every component used in every character possible with the current stroke and component sequence, the system is able to provide the most likely components that can lead to the desired character.

The Prior Art

In the Official Action, the examiner has rejected Claims 1-20 under 35 USC § 102-103 as being anticipated by and or obvious in view of Lakritz (U.S. Patent No. 5,586,198) alone and in various combinations of Freeman (U.S. Patent No. 5,649,223) and Kumai et al. (U.S. Patent No. 5,634,134). Applicant respectfully submits that the claims as amended, are patentably distinguished over the prior art.

Lakritz discloses a method for "looking up characters in ideographic alphabets" based on a graphical construction of the character on a computer screen "from a palette of radicals." As each new radical is "dragged from a palette to an onscreen canvass...the invention searches a database for characters that match the desired character." (Lakritz, col. 4, lines 7-20). Basically, Lakritz discloses the selection of 'radicals", from a "standard and well known set of 82 radicals", and their subsequent arrangement to make a picture that looks like a Chinese character.

Freeman discloses a system of producing text for computer type applications, which is responsive to inputs from keyboards or from non-keyboard apparatus. (Freeman, col. 3, lines 31-35). Freeman further discloses a method of producing text of non-alphabetic languages, whereby inputs represent phonetic sounds or elemental parameters "such as number of strokes, radicals and starting strokes of ideographic characters." (Freeman, col. 16, lines 52-62).

Kumai discloses a method and apparatus for determining the character and character mode likelihood of a string of characters keyed in by a user for a variety of languages. (Kumai, col. 3, lines 3-5). Kumai employs "a character input apparatus includ-

ing a signal storage device for storing input signals, a likelihood judging device for judging the value of the input signals, and a controlling device for switching to an appropriate process in accordance with the result of the judging by the likelihood judging device." (Kumai, col. 3, lines 3-5).

Specifically, the examiner has rejected Claims 1, 11 and 13 as being anticipated under 35 USC § 102(e) by Lakritz. As the Examiner is well aware, "Anticipation can only be established by a single prior art reference which discloses each and every element of the claimed invention." Structural Rubber Products Company v. Park Rubber Company, 749 F.2d. 707, 223 USPQ 1264 (Fed. Cir. 1984). Further, "Absence from a cited reference of any element of a claim of a patent negates anticipation of that claim by the reference." Kloster Speed Steel A.B. v. Crucible, Inc., 793 F.2d 1565, 230 USPQ 81 (Fed. Cir. 1986), on hearing, 231 USPQ 160 (Fed. Cir. 1986). Thus, if even a single element found in the amended claims rejected under 35 U.S.C. §102 is not identically and exactly disclosed in the prior art relied upon by the Examiner, the Examiner's rejection of these claims as amended, under 35 U.S.C. §102 is improper.

Nowhere does Lakritz disclose a technique for analyzing the frequency with which a chosen component of a character relates to other previously or subsequently chosen characters. When a "stroke" or "radical" is chosen in Lakritz, all possible candidate characters, which may number in the hundreds or thousands, are displayed in a random order, unlike in the present invention, wherein a sequence of the most probable candidates are displayed based on a variety of parameters, including the frequency of occurrence of the character as the first character of a word with respect to an operator's lan-

guage, the orthographic components of the character in writing order, and indicators of the character's membership within various subsets of Chinese characters. This is an important advantage with Applicant's invention, especially when the display area is limited, such as with a cell phone. Therefore, because Lakritz lacks a key element of Applicant's claimed invention, Applicant respectfully submits that the rejection of Claims 1, 11, and 13 based on 35 U.S.C. §102 has been overcome.

Additionally, the examiner has rejected Claims 2-4, 12, and 14 under 35 USC § 103 as being unpatentable over Lakritz (U.S. Patent No. 5,586,198), as applied to Claims 1 and 11 above, and further in view of Freeman (U.S. Patent No. 5,649,223) and has rejected Claims 5-10 and 15-20 as being unpatentable over Lakritz (U.S. Patent No. 5,586,198), as applied to Claims 1 and 11 above, and further in view of Kumai et al. (U.S. Patent No. 5,634,134). Applicant respectfully submits that the claims, as amended, are patentably distinguished over the prior art. As the examiner is aware:

> "The initial burden of establishing a basis for denying patentability to a claimed invention rests upon the examiner. In re Piasecki, 745 F.2d 1468, 223 USPQ 785 (Fed. Cir. 1984). In establishing a prima facie case of obviousness under 35 U.S.C. 103, it is incumbent upon the examiner to provide a reason why one of skill in the art would have been led to modify a prior art reference or to combine reference teachings to arrive at the claimed invention. Ex parte Clapp, 227 USPQ 972 (BPAI 1985). To this end, the requisite motivation must stem from some teaching, suggestion or inference in the prior art as a whole or from the knowledge generally available to one of ordinary skill in the art and not from appellant's disclosure. See, for example, Uniroyal Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988). Furthermore, rejections based on §103 must rest on a factual basis with these facts being interpreted without hindsight reconstruction of the invention from the prior art. The examiner has the initial duty of supplying the factual basis for the rejection. The examiner may not, because of doubt that the invention is pat-

> entable, resort to speculation, unfounded assumption or hindsight reconstruction to supply deficiencies in the factual basis. See In re Warner, 379 F.2d 1011, 154 USPQ 173 (CCPA 1967)." (Ex parte Martha Taylor-Varney, Appeal No. 94-3760, BPAI, unpub., 1994, p. 4.)

Unlike the prior art systems and methods, the present invention comprises an improved technique for efficiently inputting Chinese character based text into a machine. In accordance with the inventive technique, Chinese characters are input or formed based primarily on a taught stroke, component or character order in conjunction with an interactive self-evolving database that constantly updates the stored data based on previous operator input. As individual strokes, components or characters are input in their proper order, likely candidate characters are displayed based on the stored data. Then, as the operator selects candidate characters, the database is updated to reflect the specific operator's choice. Therefore, when the operator subsequently inputs similar initial strokes, components or characters, the order of displayed candidate characters will reflect previous operator selections.

More specifically, Claim 1 of the present invention is directed to:

> A system for input of Chinese characters into a machine comprising:
>
> means for input of information, said means for input further comprising means for selecting information from the group consisting of a stroke, a component and a character;
>
> means for storage of data related to the properties of individual Chinese characters, [and] data related to the properties of individual Chinese compounds and data related to the component parts of Chinese characters wherein the data related to Chinese characters includes (1) the identification and order of strokes used to write said character, said strokes being in accordance with a selected classification scheme, (2) the frequency of occurrence of said character as the first character of a word with

respect to an operator's language, and (3) the orthographic components of said character in writing order;

means for process of said input information into internal codes for said Chinese characters, said process means including a plurality of Chinese characters encoding processes based on said stored data; and

means for display providing indication of correspondence between elements of said means for input and said display; wherein input of said information presents further character selection information in response to said input. (Instant claim 1 as amended).

Also in contrast to the aforesaid prior art, Applicant's Claim 11 discloses:

A method for inputting Chinese characters into a machine comprising the steps of:

(a) inputting a selection, said selection comprising one of a displayed component, stroke and wildcard;

(b) displaying a list of candidate characters and a list of candidate components resulting from the selection;

(c) selecting a displayed character or, if a desired character is not displayed, inputting a further selection, said further selection comprising one of a displayed component, stroke and wildcard; and

(d) selecting a word associated character or a non-word associated character, such that Chinese text is constructed with said selections. (Instant claim 11 as amended).

Nowhere does Lakritz, Freeman or Kumai disclose a technique for efficiently inputting Chinese orthographic characters based upon stroke, component or character order in conjunction with an interactive self-evolving database that constantly updates the stored data based on previous operator input. The method disclosed in Lakritz, of looking up characters in an ideographic alphabet, is a graphical jigsaw puzzle only and relies heavily on positional relationships of the puzzle pieces to enable characters that are real Chinese characters to be drawn from font memory. In practice, this would be like taking the word 'commentary' and breaking it into particles 'com', 'ment' and 'ary' and then selecting say 'ment' and placing it in the second box of text boxes drawn in a line. The

software then finds every occurrence of words that have 'ment' in box two and presents candidates. Unfortunately, if the user inadvertently selects 'men' as a particle, the number of candidates is extended and if 'me' is chosen then the problem is exacerbated. A user of ideographic languages would no more rearrange the written order than a user of alphabetic languages would chose to write words backwards!

The approach taught by Lakritz, of using a predetermined menu of 82 radicals, bears no resemblance to the way in which an ordinary person creates text in the ideographic language, and therefore, bears no resemblance to Applicant's claimed invention. Applicant's components are not arranged to be accessed in a fixed manner, but are displayed in order of their usefulness as a consequence of beginning to type the strokes of a character. Specifically, the problem addressed by Applicant's invention is how to create ideographical data using a minimal keypad and minimal display such as those found in a wireless phone. In the claimed invention, positional information is completely ignored since it is quite superfluous when one considers formal writing order of the elemental strokes that make up the character intended.

Applicant discloses the presentation of elemental parts (which a user may recognize) in a way that maximizes the user's success rate in composing text. These elemental parts (components) are generally composed of a plurality of strokes but are sub-particles of Radicals or BuShou whenever they lead to such elements. In fact the technology described by Applicant, contemplates in excess of 900 such particular structures. In a manner similar to spelling in alphabetic texts, a user will know the initial strokes, which begin a character, having dedicated countless hours of childhood learning. Showing the most

likely character outcomes as early as possible is a requirement, which is constrained by the screen size.

Furthermore, Lakritz does not teach providing a user with anything beyond his preset 82 radical building blocks. Apparently, anything not available in those building blocks will not result in a character. For example the character 'yi' (looks like a letter Z with slight bias) is a single stroke and in the examples shown in Lakritz does not appear.

Regarding Freeman, the navigational mechanics which is ostensibly taught in Freeman, in no way relates to Applicant's claimed method of indexing the Chinese language and guiding a user to desired target characters, based upon user recognition of elemental parts. Additionally, the concept of inflection codes, as taught in Freeman, is flawed completely when applied to a language construct, which is asyllabic. Written Chinese has no discernable syllabic members, which are incomplete characters that would be recognized as such by a Chinese user. The decomposition of a character in this way, as suggested in Freeman, is invalid. Lastly, the satellite and reference keys disclosed in Freeman in no way relate to the "wild card" or "more" keys as taught by Applicant, which serve as a place-holder for any stroke and for displaying a set of next most frequent characters, respectively.

Finally, the technology disclosed in Kumai, is a scheme for assessing best fit from a multiple assignment keypad. For example if ten keys were assigned to ten letters, symbols or plural symbols, then the mechanism described would simply try all combinations to find, for any sequence of keys, the most likely symbol set that would be best repre-

sented. This is all predicated upon a core of preconditioned statistics such that the symbol set having the highest probability is selected.

As such, Kumai has no bearing on Applicant's teachings. Character frequency, as disclosed by Applicant, is not touched on by Kumai, rather, frequencies are assessed on the syllabic occurrences in the syllabary. The symbols for the Kana syllables do not occur in the Han Character set at all. This is exactly like determining the frequency of letter occurrences in a Latin text and quite distinct from completed word or word particle frequency.

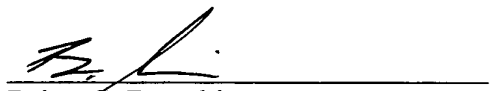
As disclosed in the present invention, characters are formed in a taught order of writing individual strokes. Each stroke may be used independently and resulting characters are displayed in likelihood order. In this described method, the selection of a category gradually excludes candidates until the desired candidate is displayed. Because there is a prescribed order of construction, the user sees certain distinct formations before the brush (in the written practice of the art of ideography) would be repositioned. These natural construction gaps mark the completion of a component. Components may be categorized as the first, second or third written particles of a character (those with more components are usually visible prior to the need to add the next component). In the prior art 'radicals' are used linguistically to determine the basis for the character derivation by meaning or implication and may be complex or not written first. In this matter Applicant's invention differs greatly. In the present invention, components are recognized at each stage and then candidates that contain the explicit component are shown for selec-

tion. Excluding candidates that may be stroke congruent though not component congruent greatly accelerates user performance and augments ease of use.

Thus, since this specific, advantageous combination of features of Applicant's claimed invention is nowhere disclosed or suggested in the aforesaid prior art, it is respectfully submitted that none of said prior art, whether taken singly, or in any combination, anticipates or renders obvious Applicant's claimed invention. Thus, it is respectfully submitted that the Examiner's rejections of the claims, as amended, under 35 USC §§ 103 as being rendered obvious by Lakritz in combination with Freeman and or Kumai, have been overcome.

Please charge any additional fee occasioned by this paper to our Deposit Account No. 03-1237.

Respectfully submitted,



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